

CLAIM AMENDMENTS

The current claim status is:

Claim 1. (currently amended) A system for batch processing ~~providing~~ a plurality of different combinatorial catalyst materials for evaluation comprising:

a physical vapor deposition apparatus including a sealable deposition chamber having a load lock chamber for receiving sample assemblies to be processed ~~an access means~~, the deposition chamber including a plurality of separately controllable plasma sources radially disposed about a central location within the deposition chamber such that the plasma directed from the sources may be focused upon the central location and ~~at least one~~ a substrate disposed upon a shaft vertically positioned at the central location of the deposition chamber around which shaft the substrate may axially rotate, the substrate having a plurality of discrete separated areas thereon corresponding to the sample assemblies to which the plasma may be directed, ~~at least one~~ each of the plurality of separately controllable plasma sources comprising a cluster of ~~more than one~~ plasma guns oriented with respect to the central location such that each gun in the cluster may be focused upon a selected sample assembly in ~~toward~~ the central location wherein the deposition of plasma of a predetermined type and in a predetermined amount upon each selected sample assembly by each plasma gun is controlled;

the ~~at least one~~ substrate being controllably positionable within the deposition chamber such that a first sample assembly selected area upon the substrate may be positioned in accordance with a selection from a matrix of x , y , z and z coordinates that define the location of the sample assembly, wherein, z defines axial rotation coordinates that align the sample assembly on the substrate with one of the plasma gun clusters, x defines vertical coordinates that align the same sample assembly with the same one of the plasma gun clusters and y defines horizontal coordinates that align the same sample assembly with the same one of the plasma gun clusters, each such alignment occurring when the plasma gun clusters are sequentially focused upon each sample assembly as the substrate rotates to a fixed radial position around the central axis in an alignment with respect to the focus of each of the plurality of separately controllable plasma sources;

a means for controlling the plasma deposition on each selected sample assembly area from each sources when the plasma source and the substrate are in alignment such that each sample assembly selected area upon the substrate may be sequentially aligned with respect to each plasma source according to predetermined parameters that determine the exposure of the sample assembly area to each ~~one or more than one~~ of the controllable plasma sources.

Claim 2. (currently amended) The system of claim 1 in which ~~the means for~~ controlling the plasma sources comprises programmingable parameters determining, for a specified flux of plasma power and time, the characteristics of the material deposited by the plasma source upon the selected sample assembly area of the substrate.

Claim 3. (cancelled)

Claim 4. (cancelled)

Claim 5. (cancelled)

Claim 6. (currently amended) The system of claim ~~3~~ 1 in which the substrate includes multiple separately defined circular areas and is centrally positioned within the chamber, the substrate being moveable with respect to a program controlled x-y table such that each separately defined circular area upon the surface of the substrate may be positioned by control means for the x-y table in ~~essential~~ alignment with the focus of ~~one or more than one~~ a plasma source.

Claim 7. (cancelled)

Claim 8. (currently amended) The system of claim 6 in which the multiple separately defined selected circular areas of the substrate ~~are comprise a plurality of separately defined areas~~ arranged in the a matrix defined by columns and rows.

Claim 9. (currently amended) The system of claim 8 in which the relationship of the number (N) of separately defined circular areas in the rows to the number of separately defined circular areas (N) in the columns is $rows_N = columns_N$.

Claim 10. (currently amended) The system of claim 8 in which the relationship of the number (N) of separately defined circular areas in one column to the number of separately defined circular areas in an adjacent column is $areas\ in\ column_N = N$ and $areas\ in\ adjacent\ column_{N+1} = N+1$.

Claim 11. (currently amended) The system of claim 8 in which the relationship of the number of separately defined circular areas in one row to the number of separately defined areas in an adjacent row is : areas in row_N = N and areas in adjacent row_{N-1} = N-1.

Claim 12. (currently amended) The system of claim 1 in which the plasma sources are controlled such that the materials originating from the sources are deposited upon a selected area of the substrate in ~~at least one~~ either of 1) a sequential layer deposition and 2) a co-deposition.

Claim 13. (currently amended) The system of claim 8 wherein the substrate comprises a side surface of a block positioned within the central location of the chamber, the block having a multiplicity of cylindrical substrate elements extending from the side surface thereof, each cylindrical substrate element individually defining a selected area, the cylindrical substrate elements maintained in an array of ~~cylindrical~~ columns and ~~cylindrical~~ rows formed within the block, in which the upper surfaces of the cylindrical substrate elements comprise the discrete areas exposed to the sources.

Claim 14. (currently amended) The system of claim 13 in which the cylindrical substrate elements are inset within the block in athe matrix and a plate having a plate matrix of openings concentric with the matrix of elements in the block is applied facing the surface of the block, such that the openings in the plate are aligned with the elements and ~~the a~~ cross-section area of an opening in the plate is less than ~~the a~~ cross-section area of the surface of the corresponding concentric cylindrical element.

Claim 15. (currently amended) The system of claim 6 in which ~~the means for~~ controlling and selecting the sources of different ions at each plasma source includes programming means ~~for selecting one or more than one of at least:~~ 1) the ions emitted by eacha plasma source within a cluster; 2) ~~the a~~ power and ~~the a~~ duration of operation ~~of~~ for the source; and 3) the position of the substrate, such that ~~the a~~ selected area of the substrate is exposed to the plasma source at the selected power and at the selected~~for the duration of operation determined.~~

Claim 16. (currently amended) The system of claim 15 in which ~~the means for~~ selecting a plasma sources and ~~the means for~~ controlling the power and the duration of operation of the

source includes ~~means for~~ controlling the sources in ~~essentially~~ the same operation such that plasma materials from the sources are co-deposited with respect to ~~an~~ the selected area on the surface of the substrate.

Claim 17. (currently amended) The system of claim 15 in which ~~the means for~~ selecting a plasma source and ~~the means for~~ controlling the power and the duration of operation of the source includes ~~means for~~ controlling the sources in ~~essentially~~ the same operation such that plasma materials from the sources are deposited as layers with respect to ~~an~~ the selected area on the surface of the substrate.

Claim 18. (currently amended) The system of claim 13 in which ~~the means for~~ controlling and selecting ~~the sources of~~ different ions at the plasma source includes ~~programmed means for~~ selecting one or more than one of at least: 1) one plasma source within a cluster; 2) ~~the a~~ power and ~~the a~~ duration of operation of the source; and 3) the position of the substrate such that ~~the a~~ selected area of the substrate is exposed to the selected plasma source at the selected power and at the selected ~~for the duration of operation determined.~~

Claim 19. (currently amended) The system of claim 18 in which ~~the means for~~ selecting ~~a~~ the plasma source and ~~the means for~~ controlling the power and the duration of operation of the source includes ~~means for~~ controlling the sources in ~~essentially~~ the same operation such that plasma materials from the sources are co-deposited with respect to the selected ~~an~~ area on the surface of the substrate.

Claim 20. (currently amended) The system of claim 18 in which ~~the means for~~ selecting ~~the a~~ plasma source and ~~the means for~~ controlling the power and the duration of operation of the source includes ~~means for~~ controlling the sources in ~~essentially~~ the same operation such that plasma materials from the sources are deposited as layers with respect to the selected ~~an~~ area on the surface of the substrate.